

# Modeling Virtual Healthcare Systems: Methods for Qualitative Case Analysis and Sociometry of Institutional Infrastructures

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**Abstract:** The objective of this paper is to present a strategy for the qualitative analysis of virtual institutional infrastructures serving complex healthcare systems. Methodologies considered include case analysis, grounded theory, and sociometry. The discussion is illustrated with references to case analyses of diverse healthcare systems. Particular attention is focused on ideological values expressed in market dynamics and system control structures.

## Introduction

Research in science policy, institutional economics, telecommunications, and organization theory has contributed to the growing literature on healthcare system performance, management and control [1], [2]. The premise of this research is that study of configurations and evolutionary patterns of virtual institutional healthcare infrastructures is critical to understanding global and regional healthcare ideologies and market dynamics [3]. Little research has considered the effects of telecommunications and Internet infrastructures on these dynamics, largely because theory, methods and tools have not been adapted adequately to the study of these structures and processes profoundly transformed by new developments in global telecommunications [4].

## Telecommunications, the Internet and Healthcare Systems

Virtual institutional infrastructures contribute to healthcare markets through the dynamics of supply and demand as well as system control. Market dynamics include supply of programs and services (*push*) as well as response to consumer demand (*pull*). Control mechanisms include emergent behavioral norms and structural hierarchies. These dimensions define a typology of healthcare system structures and their fundamental values or ideologies as shown in Figure 1 [3]:

Control Mechanisms		
Market Dynamics	BEHAVIORAL NORMS	STRUCTURAL HIERARCHIES
PUSH Supply	I Professional Covenants Professional Values American Medical Association	II National Constitutions Citizenship Values British National Health Service
PULL Demand	III Free Markets Consumer Values Health on the Net Foundation	IV Business Contracts Managerial Values Kaiser Permanente

Figure 1: Healthcare System Typology

Virtual healthcare institutions form network nodes to implement policy and they play an intermediary role in healthcare markets where service providers and healthcare consumers enter into exchange relationships. Such institutions are part of the healthcare system superstructure, coordinating activities of substructure organizations providing healthcare services. Research in economics has traditionally focused on substructure organizations, while linking organizations and their institutional contexts are critical to market dynamics affecting healthcare systems.

## Qualitative Research Methodologies

The analysis of healthcare systems and their ideologies requires qualitative research strategies because of increasing system complexity and high rates of social, cultural and technological change. First, case analysis facilitates validation of patterns identified in data collected from diverse sources and construction of comparative frameworks from such grounded theory patterns [5], [6]. Historical analysis exposes the logic of system evolution, as in the phases of system creation through integration and

horizontal coordination [7], [8]. Another promising approach is the sociometric analysis of virtual infrastructures on the Internet and their contribution to healthcare service markets and institutional networks [1], [2]. Network structure in this context is a system or configuration of relations among network nodes representing sites or pages on the Internet. Properties of these information structures include attributes of network nodes as well as the nature of relations among such nodes. Network configurations arising from these properties reflect institutional patterns of information management and control, including free market and centralized social medicine dynamics. For example, density or connectedness may describe the number or proportion of possible linkages appearing in a network, while hierarchy or dominance describes the distribution of linkages throughout the network. Configurations identified may be interpreted within Web sites, within particular healthcare systems, and at the interface between complex systems and the Internet. Taken together, case analysis, grounded theory, and sociometry offer methodological strategies to approach study of the important coherence between ideologies such as those represented in Figure 1 and virtual healthcare system infrastructures.

## Conclusion

Qualitative research methodologies contribute to a rich understanding of the behavioral dimensions shaping virtual healthcare infrastructures and their ideological foundations. Such understanding is essential to the integrating role of medical informatics in diverse global healthcare services markets.

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